Science Council of British Columbia

Sixth Annual Report 1983-84

Secretariat on Science,
Research and Development

85-0617/

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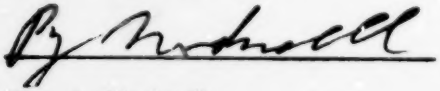
June 30, 1984

The Honourable Patrick L. McGeer,
Minister of Universities,
Science and Communications,
Province of British Columbia,
Parliament Buildings,
VICTORIA, B.C.
V8V 1X4

Dear Dr. McGeer;

I have the honour to present to you the Sixth Annual Report of the Science Council of British Columbia, and of the Secretariat on Science, Research and Development for the year ended March 31, 1984.

Respectfully submitted,



Roy A. Nodwell,
Chairman,
Science Council of British Columbia

Members

MEMBER	DATE OF APPOINTMENT	CURRENT TERM EXPIRES
Dr. R.A. Nodwell Vice President, TIR Systems Limited, Vancouver	July 15, 1981 (Chairman from January 15, 1984)	January 15, 1986
Mr. R.W. Keyes Consulting Economist, West Vancouver	December 14, 1978 (Chairman from January 15, 1981)	January 20, 1984
Dr. W.M. Armstrong Retired, Vancouver	January 29, 1982	Honorary Member
Mr. G.S. Balcom Senior Vice President, Sydney Development Corporation, Vancouver	March 24, 1983	March 24, 1985
Dr. J.F. Cochran Dean of Science, Simon Fraser University	July 30, 1981	July 30, 1984
Dr. D.H. Copp Department of Physiology, University of British Columbia	January 30, 1981	February 25, 1985
Dr. H.M. Ellis Director, Research and Development B.C. Hydro, Surrey	November 23, 1979	January 20, 1984
Mr. K.A. French President, Forintek Canada Corporation, Vancouver	February 23, 1984	February 23, 1986
Dr. D.A. George Dean of Engineering Science, Simon Fraser University	July 28, 1983	July 28, 1985
Dr. J.C. Madden President, Microtel Pacific Research Limited, Burnaby	July 15, 1981	July 15, 1984

Members *cont.....*

MEMBER	DATE OF APPOINTMENT	CURRENT TERM EXPIRES
Mr. R.D. Malcolm Barrister & Solicitor, Ladner Downs, Vancouver	September 18, 1980	January 20, 1984
Dr. G.A. May President, George A. May & Associates Ltd., Sooke	July 28, 1983	July 28, 1985
Mr. D.F. Miller Corporate Director, Vancouver	December 14, 1983	December 14, 1985
Dr. V.A. Mode Director, B.C. Research, Vancouver	January 30, 1981	March 1, 1984 (Resigned)
Dr. J.D. Murdock President, Chemetics International Limited, Vancouver	July 12, 1979	July 12, 1983
Dr. T.W. Pearson Department of Biochemistry and Microbiology, University of Victoria.	December 3, 1981	December 14, 1985
Dr. G.W. Poling Head, Department of Mining and Mineral Process Engineering, University of British Columbia	February 23, 1984	February 23, 1986
Mr. S.C. Rooney President, Durand Machinery Company Limited, New Westminster	March 6, 1980	April 24, 1984
Dr. P.C. Trussell Chairman, Forest Research Council, Richmond	June 29, 1978	July 15, 1983
Dr. L.M. Wedepohl Dean of Applied Science, University of British Columbia	November 23, 1979	July 15, 1983

Members *cont.....*

MEMBER	DATE OF APPOINTMENT	CURRENT TERM EXPIRES
Mr. A.R. Williams Corporate Vice President (Western Canada), Canadian National Vancouver	February 23, 1984	February 23, 1986
Mr. H.M. Wright Chairman, Wright Engineers Ltd., Vancouver	November 2, 1978	January 20, 1984

Research Secretariat of B.C. Staff (April 1983 – March 1984)

Dr. J.T. Sample	Executive Director
Dr. M.A. Cairns	Associate Director
Miss T.L. Bowyer	Receptionist
Ms. P.K.P. Chau	Awards Officer
Mrs. M.G. Eickhoff	Secretary (B.C. HCRF)
Miss C.J. Graham	Research Officer
Mrs. P.A. McKeever	Secretary
Mr. D.G. McPherson	Accountant (part-time consultant)
Mr. K. McPherson	Innovation Coordinator
Mr. D.A. Rodger	Information Officer (part-time consultant)
Mrs. M.L. Welsh	Secretary (Grants)
Dr. D. Whitney	Awards Officer (B.C. HCRF)

From the Chairman

The Science Council of British Columbia is a unique institution. When it was founded in 1978 it was the only science and technology agency in Canada having both an advisory role to its sponsoring government and a granting role to support applied scientific research.

The Council consists of fifteen independent members from industry and the universities who are appointed by the Minister of Universities, Science and Communications; they serve without remuneration. The administration and implementation of Science Council policy decisions is handled by the staff of the Secretariat on Science, Research and Development. This division of operations has made it possible to maintain a close administrative watch over the projects while, at the same time, permitting a broad overview of policy as determined by the Council. At least two other provinces are now setting up organizations to emulate ours!

Early Successes in Industry

Investment in applied scientific research is, by its very nature, a long range venture. The original idea or concept, usually arising from "pure" research carried out in a university or industrial laboratory, must be developed to show, first, that it is scientifically correct, second, that it is technically feasible and third, that it is commercially attractive. Only after all three criteria are satisfied does it become reasonable to begin the process of raising capital, establishing production facilities and launching a marketing plan.

Most experienced observers expect a project to take from eight to ten years to bring a new product or process to the market and achieve success. Viewed in this context I believe our record of achievement is remarkable! We began making grants just four years ago yet, according to a survey conducted by the Secretariat, between 150 and 200 new permanent jobs have been created from projects originally supported by the Science Council.

The survey of seventeen companies showed that sales in excess of $30 million are being projected by these firms in 1985. A large proportion will be export sales. Furthermore, future prospects are even more attractive. All of the seventeen companies cited are in a very early stage of development and we can expect all of them to increase their sales substantially (some spectacularly!) in the next few years. What's more, having looked over the many projects we are currently supporting, where perhaps two to three more years of work remains to be done before they are brought out of the laboratory and into the marketplace, I can see that the number and value of our successes will increase dramatically in the mid to late 1980's.

From the Chairman *cont.....*

Grants

Our largest expenditure is directed to research assistance grants and, in the two competitions for grants held in 1983-84, a total of $3,390,436 was shared by 61 projects.

But, if science-based industry is to continue to grow in British Columbia, it is essential for young scientists to become more aware of the challenge and satisfaction to be found in applying science for industrial purposes. To this end, the Science Council supports two programs: The Graduate Research in Engineering and Technology (G.R.E.A.T.) scholarships are designed to encourage students to undertake graduate research in cooperation with a B.C. company; the Industrial Post-Doctoral Fellowships (I.P.D.F.'s) provide support for recent Ph.D.'s to work with appropriate firms.

In 1983-84, there were 46 G.R.E.A.T. scholarships worth $11,500 each, while six Industrial Post-Doctoral Fellowships, valued at $25,000, were given.

In a related activity, the Science Council participated with Discovery Foundation in establishing the B.C. Innovation Office to assist in the transfer of technology from the laboratory to the marketplace.

Studies and Surveys

The Council usually meets on the last Friday of every month to review the progress of those benefitting from its funding programs, to evaluate grant applications and to consider a variety of policy initiatives. Among the latter was an important survey of the present state of aquaculture in British Columbia. One of the reasons this was undertaken was to provide guidance to the Council's own Aquatic Sciences Review Sub-committee, when it evaluates applications from people wanting to undertake research in this area. Perhaps more important it will give those interested in the production of sea animals and plants for human consumption an overall view of the economic prospects of such endeavours.

Meanwhile, at the request of the Ministry of Universities, Science and Communications, the Research Secretariat oversaw a major survey of the computer software business in B.C.

Gold Medals Awarded

Four distinguished British Columbians were awarded our Science and Engineering Gold Medals this year. The medals, and the handsome citations that go with them, are intended to give public recognition to the outstanding achievements of our province's scientists, engineers and innovators.

The 1983 winners were *Dr. John C. Brown* of the Faculty of Medicine at the University of British Columbia, for his research into the glandular secretions of the human digestive system; *Drs. David Crampton and John B. Hutchings* of the Dominion Astrophysical Observatory near Victoria who, together with a colleague, Dr. Anne Cowley of the University of Michigan, carried out work on X-ray sources in the universe leading to the discovery of a black hole; and *Dr. John S. Hayward* of the University of Victoria's Department of Biology, for the research and development leading to the invention of the U-Vic Thermofloat jacket to combat hypothermia in the water.

Public Awareness of Science

The Council is interested in promoting a greater public awareness of and appreciation for science. It made a direct grant to the Arts, Sciences and Technology Centre in Vancouver to assist that organization in the search for its first director. We were delighted when Dr. Robert Bell, a prominent Canadian scientist, a past President of the Royal Society of Canada and the former chairman of the Science Council's Gold Medal Awards Sub-committee accepted the position. The grant from the Council is a major contribution to Dr. Bell's salary for the first year of his tenure.

In nearly every one of the school districts of the province, a book was awarded by the Science Council to the grade twelve student considered to have achieved the highest standing in the sciences.

A new video production, "Many Faces in Science", was commissioned by the Council in order to depict a number of the people and projects being assisted. Segments of the show were presented on the Knowledge TV network during University Week in October. The Science Council's photographic exhibit was set up in the Discovery Park building in Burnaby for a while, then it was moved to the Arts, Sciences and Technology Centre in Vancouver, where it included a video projection system for showing "Many Faces in Science".

Transition

Fifteen people serve as members of the Science Council of British Columbia. Terms are normally for two years, so each year some people leave the Council and new ones are appointed. Among those whose terms ended during 1983-84 were Dr. H.M. Ellis, Mr. R.D. Malcolm, Dr. J.D. Murdock, Dr. P.C. Trussell, Dr. L.M. Wedepohl and Mr. H.M. Wright, all of whom deserve a great deal of thanks for the amount of time and enthusiasm they brought to the work of the Council. Mr. R.W. Keyes, who was Chairman of the Science Council from January, 1981 to January, 1984 deserves special praise for his many hours of dedicated service.

Mr. K.A. French, Dr. D.A. George, Dr. G.A. May, Mr. D.F. Miller, Dr. G.W. Poling and Mr. A.R. Williams joined the Council in that same period and have already made significant contributions to our ongoing work.

Finally, I wish to thank the small but efficient staff of the Research Secretariat without whom the Science Council could not function. The months ahead present us with many challenges but, thanks to the professionalism of the staff and the dedication of the volunteer members of the Council and its Review Sub-committees, we will meet the challenges successfully.

Roy A. Nodwell,
Chairman

Science Council of B.C.
Schedule of Research Grant Commitments
for the year ended March 31, 1984

1. Research Grant Competition #8 - (RC-8)

GRANT RECIPIENT & ORGANIZATION	PROJECT DESCRIPTION	TOTAL $ COMMITTED 1983-84
A. AGRICULTURE & FOOD		
Dr. Arthur A. Bomke (UBC, Soil Science)	The development of a seaweed (Macrocystis integrifolia) foliar spray for use in agricultural crop production.	17,000
Dr. Roy L. Taylor (UBC, Botanical Gardens)	P.I.S.B.G. (Plant Introduction Scheme of the Botanical Garden).	75,000
Dr. P.M. Townsley (UBC, Food Science)	The continuous production of commercial mushrooms using liquid composts.	31,100
Dr. John M. Webster (SFU, Biological Sciences)	Commercial development of entomogenous nematodes to control certain insect pests of agriculture and forest nursery crops in B.C.	66,750
Dr. Mark L. Winston (SFU, Biological Sciences)	Development of a honeybee package and queen industry in B.C.	37,500
B. AQUATIC SCIENCES		
Mr. Gordon K. Davidson (Applied Electrostatics, Victoria) and Dr. S. Visaisouk (Retech, Victoria)	Production of smoked salmon by electrostatics technology.	16,000
Mr. Bodo de Lange Boom (Seakem Oceanography Ltd., Sidney)	Development of an acoustic depth sensor	75,000
Mr. Brad Hope (Tidal Rush Marine Farms Ltd. Powell River)	Evaluation of the biological and economical feasibility of sablefish mariculture.	50,000
Mr. Dan Nomura (The Canadian Fishing Co. Ltd. Vancouver)	Development of an automatic weight control system for canned salmon.	95,000
Mr. Peter A. Simon (Autonomous Underwater Systems Ltd. Vancouver)	Development of an interactive sensor/supervisory control system for specialist robotic applications, phase 1.	25,000

1. Research Grant Competition #8 - (RC-8) *cont.....*

B. AQUATIC SCIENCES *cont.....*

GRANT RECIPIENT & ORGANIZATION	PROJECT DESCRIPTION	TOTAL $ COMMITTED 1983-84
Mr. Roger J. Soar (Victoria)	Continued laboratory studies and field studies on *Myriophyllum spicatum*, to develop a tool for aquatic plant control.	49,000
C. ELECTRONICS & COMMUNICATIONS		
Dr. Josef L. Fikart (Microtel Pacific Research Ltd., Burnaby)	High gain, frequency agile, linearized upconverter for use in earth station transmitters in the 6 GHz and 14 GHz bands.	98,913
Dr. Richard F. Hobson (SFU, Computing Science)	To design and implement an interpreter 'building block' integrated circuit for multiprocessor experiments.	60,060
Dr. John Linton (Glenayre Electronics Ltd., North Vancouver)	Development of prototype high speed modem for HF radio.	141,550
D. ENERGY		
Dr. R.R. Parsons (UBC, Physics)	An advanced production system for fabricating selective solar coatings.	71,600
Dr. J. Stiles (Moli Energy Ltd., Burnaby)	A study of the growth, corrosion and dissolution of lithium deposits in lithium batteries.	80,700
E. FOREST & FOREST PRODUCTS		
Dr. Jan E. Aune (MacMillan Bloedel Research, Vancouver)	Rock detection in logs.	83,780
Dr. John H. Borden (SFU, Biological Sciences)	Management of the mountain pine beetle with semiochemicals.	25,167
Dr. Peter D. Lawrence (UBC, Electrical Engineering)	Log scaling by computer image processing.	18,764
Dr. P.A. Murtha (UBC, Forestry)	Remote sensing for early warning of incipient bark beetle attack.	25,000

1. Research Grant Competition #8 - (RC-8) *cont.....*

GRANT RECIPIENT & ORGANIZATION	PROJECT DESCRIPTION	TOTAL $ COMMITTED 1983-84
F. MANUFACTURING & MACHINERY		
Mr. N.F. Duke (Target Products Ltd., Burnaby) and Mr. G.K. Gunnyon (Hardy & Associates (1978) Ltd., Burnaby)	Development of rapid setting products for repair of roadways, bridge decks and concrete.	46,360
Dr. Brian D. Pate (UBC, Pharmaceutical Sciences and TRIUMF)	Development of a prototype whole body positron emission tomograph .	120,000
Dr. E. Teghtsoonian (UBC, Metallurgical Engineering)	Mechanical properties of hybrid composites.	40,000
G. MINING, MINERALS & METALS		
Dr. J.K. Brimacombe & Dr. I.V. Samarasekera (UBC, Metallurgical Engineering)	The development of new mold designs for continuous steel-billet casting machines.	80,000
Dr. J. Laskowski (UBC, Mining & Mineral Process Engineering)	Emulsifying reagents in the flotation of difficult-to-treat coals.	20,400
Dr. Alec Mitchell (UBC, Metallurgical Engineering)	Wear resistant surfacing of mining components.	27,560
Dr. Alastair J. Sinclair (UBC, Geological Sciences)	Statistical models for exploration and evaluation of mineral deposits in B.C.	36,800
H. TRANSPORTATION		
Mr. Gordon Armstrong (RMS Controls Inc., Port Moody)	Load scales for logging trucks.	58,500
Dr. S.M. Calisal (UBC, Mechanical Engineering)	Dynamic stability of small vessels.	33,500
	(RC-8:) TOTAL $ COMMITTED (1983-84) (29 PROJECTS)	$1,606,004

2. Research Grant Competition #9 - (RC-9)

GRANT RECIPIENT & ORGANIZATION	PROJECT DESCRIPTION	TOTAL $ COMMITTED 1983-84
A. AGRICULTURE & FOOD		
Dr. N.R. Bulley (UBC, Bio-resource Engineering)	Feasibility study of horticultural illumination with prism light guide.	52,515
Dr. Kimberly M. Cheng (UBC, Poultry Science)	Improvement of breeding stock for efficient squab production in B.C.	20,000
Dr. Julia Levy & Dr. John C. Brown (Quadra Logic Technology, Vancouver)	Development of monoclonal antibodies to bovine leukosis virus and the production of kits for the diagnosis of infections in herds of cattle.	28,000
Dr. D.S. Mavinic (UBC, Civil Engineering)	Aerobic sludge digestion with pH control—pilot study and field testing.	35,000
Dr. J.E. Rahe (SFU, Biological Sciences)	Development of white rot-resistant commercial onion cultivar.	23,826
Dr. J.S. Sim (UBC, Poultry Science)	Development of pigeon feed for squab production in B.C. and characterization of pigeon milk.	12,000
B. AQUATIC SCIENCES		
Dr. Ronald E. Foreman (Bamfield Marine Station, Bamfield)	Phycocolloid production by B.C. seaweeds.	100,000
Mr. N.W. Gibbons (Redonda Sea Farms Ltd., Refuge Cove)	Applied research to maximize the setting of oyster larvae on artificial cultch and to nurse oyster spat on artificial cultch for single culture and suspended pipe culture.	63,000
Mr. Gordon Jones (Innovative Aquaculture Products, Lasqueti Island)	Algae storage project.	60,000
Prof. B.E. March (UBC, Poultry Science)	The feasibility of genetic selection of chinook salmon for uniform flesh pigmentation.	28,900
Mr. Robert G. Saunders (Canadian Benthic Ltd., Bamfield)	The development of an intensive shellfish culture system: final phase.	50,000

2. Research Grant Competition #9 - (RC-9) *cont.....*

GRANT RECIPIENT & ORGANIZATION	PROJECT DESCRIPTION	TOTAL $ COMMITTED 1983-84
C. ELECTRONICS & COMMUNICATIONS		
Dr. Thomas W. Calvert (SFU, Computing Science)	Computer assisted film-making.	37,750
Mr. Daniel E. Friedmann (MacDonald Dettwiler & Associates Ltd., Richmond)	An image analysis system—geographic information system interface.	76,850
Mr. Daniel Gelbart (Creo Electronics Corp., Burnaby)	Development of a linear scanner for an optical tape recorder.	108,875
Mr. Richard W. McMahon (Techware Systems Corp., Vancouver)	A high level interactive software package to enable user-defined control algorithms for MICROSPUT.	89,000
Mr. David J. Nims (MacDonald Dettwiler & Associates Ltd., Richmond)	Application of film recorder technology to electronic CAD.	109,750
Dr. Lawrence Young (UBC, Electrical Engineering)	Gallium arsenide device technology.	32,336
D. ENERGY		
Dr. R.M. Clements (UVIC, Physics)	Continued development of the puff-jet ignition system.	34,700
Mr. Francis E. Kellogg (B.C. Research, Vancouver)	Development of microprocessor-based control systems for solar domestic hot water (DHW) systems—phase II.	54,650
Drs. S.R. Morrison, K. Colbow & B. Clayman (SFU, Physics)	Industrial testing of heat reflecting window glass.	53,300
Drs. A.P. Watkinson, N. Epstein, J.R. Grace & C.J. Lim (UBC, Chemical Engineering)	Spout-fluid bed and fluidized bed combustion of coal washery waste.	32,480
E. FOREST & FOREST PRODUCTS		
Dr. T.A. Black (UBC, Soil Science)	The development of an instrument for the measurement of the rate of water loss by seedlings.	23,290
Dr. Fred L. Bunnell (UBC, Forestry)	Managing forest stands to supply wildlife needs.	91,200

2. Research Grant Competition #9 - (RC-9) *cont.....*

E. FOREST & FOREST PRODUCTS *cont.....*

GRANT RECIPIENT & ORGANIZATION	PROJECT DESCRIPTION	TOTAL $ COMMITTED 1983-84
Dr. Karel Klinka (UBC, Forestry)	Rehabilitation of the Douglas-fir plantations in the Vancouver Forest Region featuring distorted growth.	62,250
Prof. Borg Madsen (UBC, Civil Engineering)	Microwave electronic grading of lumber.	29,000
Dr. Axel Meisen (UBC, Chemical Engineering)	Pheromone release devices for insect pest control.	20,000
Mr. Gordon Poritt (Windsor Machine Co. Ltd., Langley)	Developing improved saw chains for mechanical fellers.	120,000
Mr. Douglas E. Rickson (Canadian Forest Products, Vancouver)	Propagation of Douglas-fir, White spruce Lodgepole pine and Yellow cedar plantlets using tissue culturing techniques.	70,000
Dr. James K. Turnbull (MacMillan Bloedel Research, Vancouver)	Value-added products from alkaline sulfite pulping of cedar.	120,000
F. MANUFACTURING & MACHINERY		
Mr. Allan R. Murdoch (Avelan Engineering Ltd., Richmond)	Water cooled calipers fo disc brakes.	35,000
Drs. Manssur Yalpani & John Howard (B.C. Research, Vancouver)	Production of water thickening agents derived from cellulose.	15,000
G. MINING, MINERALS & METALS		
Dr. R.W. Lawrence & Mr. A. Bruynesteyn (B.C. Research, Vancouver)	Microbiological processing of chalcopyrite and other nonferrous mineral concentrates.	35,000
H. TRANSPORTATION		
Mr. Ian Sanderson & Mr. D.G. Roth (Techwest Enterprises Ltd., Vancouver)	Development of a 6 degree of freedom dynamic sensing and processing package for use in shipboard motion compensating systems.	85,760
	(RC-9): TOTAL $ COMMITTED (1983-84) (33 PROJECTS)	$1,809,432

G.R.E.A.T. Scholarships Awarded 1983-84

1. New Awards

NAME OF STUDENT	UNIVERSITY & DEPARTMENT	NAME OF ACADEMIC SUPERVISOR	NAMES OF COOPERATING ORGANIZATIONS
Norman Beaulieu	Dept. of Electrical Engineering, UBC	Dr. C. Leung	Mobile Data Int'l. Inc. Richmond, B.C.
Kevin Betts	Dept. of Physics, UBC	Dr. R.R. Parsons	Corona Vacuum Coaters Inc. Vancouver, B.C.
Jim Brown	Dept. of Biological Sciences, SFU	Dr. Brian Hartwick	B.C. Oyster Growers Assoc. Ladysmith, B.C.
			Ministry of Environment Marine Resources Branch Victoria, B.C.
Michael Curran	Dept. of Soil Science & Forest Resources Mgmnt., UBC	Dr. T.M. Ballard	MacMillan Bloedel Ltd. Nanaimo, B.C.
Michel Cusson	Dept. of Biological Sciences, SFU	Dr. B.D. Roitberg	B.C. Coast Vegetable Coop Association Richmond, B.C.
			Agriculture Canada Vancouver, B.C.
Donald Furnell	Dept. of Zoology, UBC	Dr. D.J. Randall	Pacific Biological Station Nanaimo, B.C.
Eva Gerencher	Dept. of Soil Science, UBC	Dr. L.M. Lavkulich	Environchem Consultants West Vancouver, B.C.
			E.V.S. Consultants Ltd. North Vancouver, B.C.
Steven Hill	Dept. of Oceanography, UBC	Dr. Stephen Pond	Institute of Ocean Sciences Sidney, B.C.
John Howie	Dept. of Civil Eng., UBC	Dr. R.G. Campanella	Western Geosystems Inc. North Vancouver, B.C.
R.D. Kathman	Dept. of Biology, UVIC	Dr. M.J. Ashwood-Smith	E.V.S. Consultants Ltd. North Vancouver, B.C.

1. **New Awards** *cont.....*

NAME OF STUDENT	UNIVERSITY & DEPARTMENT	NAME OF ACADEMIC SUPERVISOR	NAMES OF COOPERATING ORGANIZATIONS
Christen Moser	Dept. of Chemical Engineering, UBC	Dr. Axel Meisen	Petrosul Int'l. Ltd. North Vancouver, B.C.
Frank Peabody	Dept. of Electrical Engineering, UBC	Dr. W.G. Dunford	Cetec Engineering Co. Inc Burnaby, B.C.
Michael Peterson	Dept. of Geography, UVIC	Dr. Stanton E. Tuller	Canadian Forestry Service Victoria, B.C.
Elizabeth Power	Faculty of Forestry & Westwater Research Centre, UBC	Dr. T.G. Northcote	Houston Forest Products Houston, B.C.
James A. Reimer	Dept. of Electrical Engineering, UBC	Dr. P.D. Lawrence	RSI-Robotic Systems Int'l. Sidney, B.C.
A.W.Y. Shing	Dept. of Civil Eng., UBC	Dr. S.F. Stiemer	Coast Steel Fabricators Limited Port Coquitlam, B.C.
Antoinette Spruit-Ros	Dept. of Biology, UVIC	Dr. A. Austin	Ministry of Environment Waste Management Branch Victoria, B.C.
Gwen Waldie	Dept. of Poultry Science, UBC	Dr. J.S. Sim	Vancouver Island Mountain Squab Farm Nanaimo, B.C.

2. **Renewal Awards**

Julie Brooks	Dept. of Biological Sciences, SFU	Dr. J.H. Borden	B.C. Forest Service Burnaby, B.C.
Kenneth Chan	Dept. of Electrical Engineering, UBC	Dr. P.D. Lawrence & Dr. J.A. McEwen	Biomedical Eng. Dept. Vancouver Gen. Hospital Vancouver, B.C.
William Cochlan	Depts. of Botany & Oceanography, UBC	Dr. P.J. Harrison	Institute of Ocean Sciences Sidney, B.C.
Philip G. Comeau	Dept. of Forest Sciences, UBC	Dr. J.P. Kimmins	Crestbrook Forest Ind. Cranbrook, B.C.
Clinton Fong	Dept. of Metallurgical Engineering, UBC	Dr. Desmond Tromans	MacMillan Bloedel Research Vancouver, B.C.

2. **Renewal Awards** *cont...*

NAME OF STUDENT	UNIVERSITY & DEPARTMENT	NAME OF ACADEMIC SUPERVISOR	NAMES OF COOPERATING ORGANIZATIONS
Donald Gillespie	Dept. of Civil Eng. UBC	Dr. R.G. Campanella	Thurber Consultants Ltd. Vancouver, B.C.
Richard Kabzems	Faculty of Forestry, UBC	Dr. K. Klinka	Ministry of Forests Burnaby, B.C.
Bruce Lehmann	Dept. of Mechanical Engineering, UBC	Dr. S.G. Hutton	Kockums Industries Ltd. Surrey, B.C.
Wilf Leudke	Institute of Animal Resource Ecology, UBC	Dr. Ray Hilborn	Fisheries Assoc. of B.C. Vancouver, B.C.
Sandra O'Neill	Institute of Animal Resource Ecology, UBC	Dr. C.C. Lindsey	Pacific Biological Station Nanaimo, B.C.
William Price	Dept. of Soil Science, UBC	Dr. L.M. Lavkulich	Amax of Canada Ltd. Vancouver, B.C.
Reed Radley	Dept. of Plant Science, UBC	Dr. F.B. Holl	D. Amoore Holdings Inc. Delta, B.C.
Nancy Richardson	Dept. of Animal Science, UBC	Dr. Richard M. Beames	Dept. of Fisheries & Oceans, Fisheries Research Branch West Vancouver, B.C.
F.M.G.A. Salgado	Dept. of Civil Eng., UBC	Dr. P.M. Byrne	Golder Associates Vancouver, B.C.
Cynthia Scott	Dept. of Biological Sciences, SFU	Dr. Mark L. Winston	Okanagan Valley Pollination Association Vernon, B.C.
Barry Shell	Dept. of Bio-Resource Engineering, UBC	Dr. L.M. Staley	B.C. Hydro - Energy Use Engineering Dept. Surrey, B.C.
Clinton Smyth	Dept. of Biology, UVIC	Dr. M.A.M. Bell	Byron Creek Collieries Sparwood, B.C. Fording Coal Ltd. Elkford, B.C. Line Creek (CNRL) Sparwood, B.C. Westar Mines Ltd. Sparwood, B.C.

2. **Renewal Awards** *cont...*

NAME OF STUDENT	UNIVERSITY & DEPARTMENT	NAME OF ACADEMIC SUPERVISOR	NAMES OF COOPERATING ORGANIZATIONS
Michael Stanhope	Dept. of Biological Sciences, SFU	Dr. E.B. Hartwick	MacMillan Bloedel Ltd. Nanaimo, B.C.
R.J. Stephenson	Dept. of Bio-Resource Engineering, UBC	Dr. K. Victor Lo	Envirocon Ltd. Vancouver, B.C.
Stephen Taylor	Dept. of Forest Sciences, UBC	Dr. M.C. Feller	B.C. Ministry of Forests Smithers, B.C.
F.E. Williams	Dept. of Biological Sciences, SFU	Dr. R.A. Robinson	Pacific Forest Products Limited Victoria, B.C.

3. **Renewal Awards (Year 3)**

NAME OF STUDENT	UNIVERSITY & DEPARTMENT	NAME OF ACADEMIC SUPERVISOR	NAMES OF COOPERATING ORGANIZATIONS
James J. Clark	Dept. of Electrical Engineering, UBC	Dr. P.D. Lawrence	F.E.R.I.C. Vancouver, B.C.
Anna Colangeli	Dept. of Biology, UVIC	Dr. John N. Owens	Western Forest Products Victoria, B.C.
Neil B. Cox	Dept. of Electrical Engineering, UBC	Dr. M.R. Ito & Dr. J.A. McEwen	Vancouver Gen. Hospital Biomedical Eng. Dept. Vancouver, B.C.
Craig Forster	Dept. of Geological Sciences, UBC	Dr. L. Smith	Nevin Sadlier-Brown Goodbrand Ltd. Vancouver, B.C.
Curtis Kennedy	Depts. of Botany and Oceanography, UBC	Dr. P.J. Harrison	Dept. of Fisheries & Oceans West Vancouver, B.C.
Hae-Yong Shin	Dept. of Oceanography, UBC	Dr. W.J. Emery	MacDonald Dettwiler & Associates Ltd. Richmond, B.C.
Wayne Temple	Dept. of Soil Science, UBC	Dr. A.A. Bomke	Reynelda Farms Delta, B.C.

Industrial Post Doctoral Fellowships Awarded 1983-84

1. **New Awards**

AWARD RECIPIENT	EMPLOYING COMPANY
Heard, G.J.	George A. May & Associates Ltd. Sooke, B.C.
Gnatowski, M.J.	Industrial Science Laboratory Richmond, B.C.
Lindgren, B.S.	PMG/Stratford Projects Ltd. Vancouver, B.C.
Malcolm, A.J.	Quadra Logic Technologies Inc. Vancouver, B.C.
Rivett, G.A.	Diachem Industries Ltd. Richmond, B.C.

2. **Renewal Awards**

AWARD RECIPIENT	EMPLOYING COMPANY
Peters, J.B.	Nexus Engineering Corp. Burnaby, B.C.

AUDITORS' REPORT
TO THE MINISTER OF UNIVERSITIES, SCIENCE AND COMMUNICATION

We have examined the balance sheet of The Science Council of British Columbia and Secretariat on Science, Research and Development as at March 31, 1984 and the statements of research appropriations, expenditures and unexpended appropriations and operations appropriations, expenditures and unexpended appropriations for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as we considered necessary in the circumstances.

In our opinion, these financial statements present fairly the financial position of the Council and Secretariat as at March 31, 1984 and the results of their operations for the year then ended in accordance with generally accepted accounting principles, as modified by note 1 to the financial statements, applied on a basis consistent with that of the preceding year.

Coopers & Lybrand

Vancouver, B.C.
May 11, 1984

THE SCIENCE COUNCIL OF BRITISH COLUMBIA
AND SECRETARIAT ON SCIENCE, RESEARCH AND DEVELOPMENT
BALANCE SHEET AS AT MARCH 31, 1984

ASSETS

	1984 $	1983 $
Cash and Short-Term Deposits	3,913,513	5,059,083
Accounts Receivable	40,553	50,259
Prepaid Expenses	4,339	4,640
	3,958,405	5,113,982

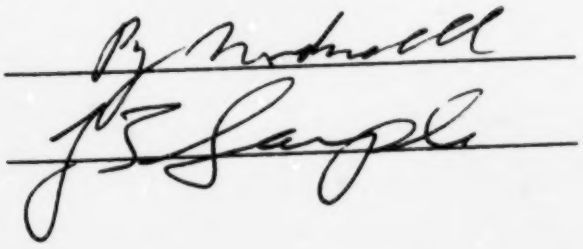
LIABILITIES

Accounts Payable and Accrued Liabilities	53,801	42,670

UNEXPENDED APPROPRIATIONS

Research (Note 2)	3,809,585	4,938,786
Operations	95,019	132,526
	3,904,604	5,071,312
	3,958,405	5,113,982

Approved by the Council and Secretariat



THE SCIENCE COUNCIL OF BRITISH COLUMBIA
AND SECRETARIAT ON SCIENCE, RESEARCH AND DEVELOPMENT
STATEMENT OF RESEARCH APPROPRIATIONS, EXPENDITURES
AND UNEXPENDED APPROPRIATIONS
FOR THE YEAR ENDED MARCH 31, 1984

	1984 $	1983 $
RESEARCH APPROPRIATIONS		
Grants from the Province of British Columbia	3,660,725	3,834,750
Interest	437,823	734,235
	4,098,548	4,568,985
RESEARCH EXPENDITURES		
Direct expenses and other	1,608	5,495
Graduate Research Engineering And Technology (GREAT) awards (see Schedule)	511,458	928,041
Grants (see Schedule)	4,294,747	3,842,097
Honoraria	7,800	11,600
Industrial Post-Doctoral Fellowships (IPDF) (see Schedule)	53,125	25,250
Public events (note 3)	31,636	57,625
Science and Engineering awards	14,858	14,968
Special requests (see Schedule)	237,401	73,120
Special projects (see Schedule)	75,116	7,567
	5,227,749	4,965,763
EXCESS OF EXPENDITURES OVER APPROPRIATIONS FOR THE YEAR	(1,129,201)	(396,778)
UNEXPENDED APPROPRIATIONS - BEGINNING OF YEAR	4,938,786	5,335,564
UNEXPENDED APPROPRIATIONS - END OF YEAR (encumbered by outstanding commitments) (note 2)	3,809,585	4,938,786

THE SCIENCE COUNCIL OF BRITISH COLUMBIA
AND SECRETARIAT ON SCIENCE, RESEARCH AND DEVELOPMENT
STATEMENT OF OPERATIONS APPROPRIATIONS, EXPENDITURES
AND UNEXPENDED APPROPRIATIONS
FOR THE YEAR ENDED MARCH 31, 1984

	1984	1983
	$	$
OPERATIONS APPROPRIATIONS		
Grants from the Province of British Columbia	355,847	374,576
Interest	10,773	12,234
	366,620	386,810
EXPENDITURES		
Computer services	3,009	4,421
Consulting fees	1,629	20,452
Furniture and equipment	4,582	19,068
Information services	15,644	21,446
Meetings	1,810	2,838
Personnel recruitment		1,459
Photocopying and printing	24,442	29,239
Postage and courier	7,841	9,849
Professional fees	8,585	6,740
Publications	1,285	1,663
Rent	53,572	54,839
Salaries and employee benefits	316,348	261,380
Stationery and supplies	3,769	3,999
Telephone	12,307	12,935
Travel	15,702	11,508
	470,525	461,836
Other		
Cedar oil marketing study		2,062
British Columbia Computer Industry Software Study	50,000	
	520,525	463,898
RECOVERY OF EXPENDITURES		
British Columbia Health Care Research Foundation	59,046	47,258
British Columbia Computer Industry Software Study	50,000	
Other	7,352	15,549
	116,398	62,807
EXCESS OF EXPENDITURES OVER APPROPRIATIONS FOR THE YEAR	(37,507)	(14,281)
UNEXPENDED APPROPRIATIONS - BEGINNING OF YEAR	132,526	146,807
UNEXPENDED APPROPRIATIONS - END OF YEAR	95,019	132,526

THE SCIENCE COUNCIL OF BRITISH COLUMBIA
AND SECRETARIAT ON SCIENCE, RESEARCH AND DEVELOPMENT
NOTES TO FINANCIAL STATEMENTS
FOR THE YEAR ENDED MARCH 31, 1984

1. ACCOUNTING POLICIES

Fixed Assets

Fixed assets are not capitalized and depreciated as assets of the Council and Secretariat, but are written off in the period in which they are purchased.

Research Grants

Outstanding research grant commitments are conditional on receipt of satisfactory progress reports and are not recorded until actually disbursed.

2. RESEARCH GRANT COMMITMENTS (see Schedule)

During the year, the Council approved funding for research projects, awards, special requests and special projects totalling $4,034,454. At March 31, 1984, known outstanding commitments totalled $3,583,372 which, together with additional estimated renewed commitments for the year ending March 31, 1985 of $2,209,223, amount to $5,792,595 in known and estimated outstanding commitments.

During the year the Council continued with an agreement whereby it shares certain costs associated with The B.C. Innovation Office with The Discovery Foundation.

3. PUBLIC EVENTS

During the year, the Council was involved in public events for the promotion of awareness of science and research in British Columbia. The major events during the year ended March 31, 1984 were an exhibit at the Arts, Sciences and Technology Centre and the video production, "Many Faces in Science".

THE SCIENCE COUNCIL OF BRITISH COLUMBIA
AND SECRETARIAT ON SCIENCE, RESEARCH AND DEVELOPMENT
SCHEDULE OF COMMITMENTS AND DISBURSEMENTS OF SCIENCE COUNCIL RESEARCH GRANTS
FOR THE YEAR ENDED MARCH 31, 1984

	Known outstanding commitments beginning of year $	Additional commitments during year $	Disbursed during year $	Known outstanding commitments end of year $	Estimated renewed commitments in 1984 - 1985 $	Known and estimated outstanding commitments at March 31, 1984 $
RESEARCH GRANTS						
Unsolicited Research Projects	5,000		5,000			
Research Competition #1	19,170	(6,071)	8,649	4,450		4,450
Research Competition #2	60,113	(2,397)	29,263	28,453		28,453
Research Competition #3	240,293	(644)	164,607	75,042		75,042
Research Competition #4	497,273	(9,105)	374,357	113,811		113,811
Research Competition #5	725,398	(78,015)	541,556	105,827		105,827
Research Competition #6	668,061	(13,355)	487,090	167,616		167,616
Research Competition #7	2,214,306	(44,911)	1,352,994	816,401		816,401
Research Competition #8		1,606,004	807,363	798,641	885,148	1,683,789
Research Competition #9		1,809,432	523,868	1,285,564	936,575	2,222,139
	4,429,614	3,260,938	4,294,747	3,395,805	1,821,723	5,217,528
AWARDS						
GREAT's	3,833	507,625	511,458		287,500	287,500
IPDF's	31,250	109,375	53,125	87,500	100,000	187,500
	35,083	617,000	564,583	87,500	387,500	475,000
SPECIAL REQUESTS						
Arts, Science and Technology Centre	50,000		50,000			
Innovation Co-ordinator	124,380		50,942	73,438		73,438
UBC Robotics Grant	2,500		2,500			
H.R. MacMillan Planetarium		13,000	11,700	1,300		1,300
Methane Energy Development Office		120,759	120,759			
Science Showcase		20,000		20,000		20,000
Travel Grant		1,500	1,500			
	176,880	155,259	237,401	94,738		94,738
SPECIAL PROJECTS						
Aquaculture Study	74,188	(3,743)	70,445			
Schools' Book Prize	5,000	5,000	4,671	5,329		5,329
	79,188	1,257	75,116	5,329		5,329
	4,720,765	4,034,454	5,171,847	3,583,372	2,209,223	5,792,595